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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/689,273 (6,941,799)
Filing Date	10/20/2003 (9/13/2005)
First Named Inventor	McCabe
Art Unit	2855
Examiner Name	McCall, Eric Scott
Attorney Docket Number	BW-DKT03086

Total Number of Pages in This Submission: 24

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
- ☐ After Allowance communication to Technology Center (TC)
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☑ Other Enclosure(s) (please Identify below):

PostCard
Certificate of Correction for PTO Mistake
Copies of Office Action, Patent Claims

Remarks

Certificate
OCT 19 2005
of Correction

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Brown & Michaels, PC
Signature	
Date	10/11/05

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Judy H. Barron		
Signature	Judy H. Barron	Date	10/11/05

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Number: 6,941,799

Issued: September 13, 2005

Name of Patentee: McCabe et al.

Title of Invention: Real-Time Control System and Method of Using Same

Commissioner of Patents
Alexandria, VA 220313-1450
Attn: Decision and Certificate of Correction Branch
of the Patent Issue Division

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT FOR PTO MISTAKE (37 CFR 1.322)

1. Attached in duplicate is Form PTO-1050 with at least one copy being suitable for printing.

2. Attached are copies of the following:

- Office action response dated March 8, 2005
- Copy of the relevant claims for issued patent 6,941,799 (Columns 15 and 16)

3. The exact page and line number where errors occur in the application file are:

Column 15, line 20 (Claim 6, line 2): "cam-shaft" should read "camshaft".

Column 16, line 28 (Claim 15, line 2): "cain-shaft" should read "camshaft".

Column 16, line 30 (Claim 16, line 2): "crank-shaft" should read "crankshaft".

4. Regarding these errors introduced by the patent office, the correct wording is found in the claim listing of the office action response dated March 8, 2005. More specifically, the correct wording for each of the errors can be found:

Claim 6 (claim 7 of the application, as filed): page 5, claim 7, line 2.

Claim 15 (claim 17 of the application, as filed): page 7, claim 17, line 1.

Claim 16 (claim 18 of the application, as filed): page 7, claim 18, line 1.

5. Please send the Certificate to:

Meghan Van Leeuwen
Brown & Michaels, P.C.
400 M&T Bank Building
118 North Tioga Street
Ithaca, New York 14850-4343

Assignee: BorgWarner Inc.

By: _____
Meghan Van Leeuwen
Agent of Record

☒ Assignment recorded on 12/09/03 Reel 014623 Frame 0711

OCT 19 2005

OCT 19

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,941,799

DATED: September 13, 2005

INVENTOR(S): McCabe et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 15, line 20: replace "cam-shaft" with "camshaft".

Column 16, line 28: replace "cain-shaft" with "camshaft".

Column 16, line 30: replace "crank-shaft" with "crankshaft".

MAILING ADDRESS OF SENDER: **PATENT NO. 6,941,799**

Brown & Michaels
400 M&T Bank Building
118 North Tioga Street
Ithaca, New York 14850-4343

(PTO FORM 1050)

OCT 19 2005

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,941,799

DATED: September 13, 2005

INVENTOR(S): McCabe et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 15, line 20: replace "cam-shaft" with "camshaft".

Column 16, line 28: replace "cain-shaft" with "camshaft".

Column 16, line 30: replace "crank-shaft" with "crankshaft".

MAILING ADDRESS OF SENDER: **PATENT NO. 6,941,799**

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(PTO FORM 1050)

PTO/SB/21 (08-03)
Approved for use through 08/30/2003. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/689,273
Filing Date	10/20/2003
First Named Inventor	McCabe
Art Unit	2855
Examiner Name	McCall
Attorney Docket Number	BW-DKT03086

Total Number of Pages in This Submission: 17

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Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Brown & Michaels, PC
Signature	
Date	3/8/05

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Typed or printed name	Judy H. Barron		
Signature	Judy H. Barron	Date	3-8-05

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

March 8, 2005

Serial No.	10/689,273
Applicant:	McCabe
Filed:	October 20, 2003
Title:	A REAL-TIME CONTROL SYSTEM AND METHOD OF USING SAME
Art Unit:	2855
Examiner:	McCall
Confirmation Number:	2920
Attorney Docket No.:	BW-DKT03086

HONORABLE COMMISSIONER OF PATENTS
Alexandria, VA 22313-1450

AMENDMENT

AND RESPONSE TO OFFICE ACTION

In response to the Office Action dated December 13, 2004, please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 4 of this paper.

Remarks/Arguments begin on page 8 of this paper.

CERTIFICATE OF MAILING

Certified Mail No.: 7003 0500 0002 3235 0219 Date: March 8, 2005

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Judy H. Barron

Judy H. Barron

single sensed cam pulse 32. This scenario is indicated by indicators 38 and 39 respectively. Similarly, sensed cam pulse 34 is an updated pulse that is used twice by controller loop execution 44 as the sensed pulse wheel signals are not updated as the second control loop 45 occurs. This scenario is indicated by indicators 3638 and 3739 respectively. Typically, the second scenario occurs at low engine speeds.

Please replace the ABSTRACT section on page 26, lines 1-12 with the following ABSTRACT section starting on page 26, line 1:

ABSTRACT

Aa real-time control system having a fixed loop time is provided. The system includes an input having frequency ranging both above and below the fixed loop time; and a method for utilizing information provided by a pulse wheel and sensed by a sensor. The method includes the steps of: providing a rotating shaft; providing a pulse wheel rigidly affixed onto the rotating shaft; providing a sensor sensing an information out of the pulse wheel, the sensed information comprising a first information and a second information; and when the rotating rate of the rotating shaft is greater than a predetermined value, averaging at least two pulses wherein one of the at least two pulses being related to the first information and at least one pulse being related to the second information; thereby, the second information is used along with the first information for a more accurate representation of the information.

Amendments of the Claims:

A detailed listing of all claims in the application is presented below. This listing of claims will replace all prior versions, and listings, of claims in the application. All claims being currently amended are submitted with markings to indicate the changes that have been made relative to immediate prior version of the claims. The changes in any amended claim are being shown by strikethrough (for deleted matter) or underlined (for added matter).

1. (Currently Amended) A real-time control system having a fixed loop time, comprising:

an input having a frequency ranging both above and below the fixed loop time;

~~and~~

~~a method for utilizing information provided by a pulse wheel and sensed by a sensor, comprising the steps of:~~

~~providing~~ a rotating shaft;

~~providing~~ a pulse wheel rigidly affixed onto the rotating shaft; and

~~providing~~ a sensor sensing ~~an~~ plurality of information pulses out of the pulse wheel, wherein the ~~sensed~~ information pulses comprise~~ing~~ a first information pulse and a second information pulse; ~~and~~

wherein when ~~athe~~ rotating rate of the rotating shaft is greater than a predetermined value, ~~averaging~~ at least the first information pulse and the second information pulse are averaged~~two pulses wherein one of the at least two pulses being related to the first information and at least one pulse being related to the second information;~~ such that the first information pulse and the second information ~~is used along with the first information~~ pulse accurately represent the plurality of information pulses in a variable cam timing measurement system~~for a more accurate representation of the information~~.

2. (Currently Amended) The method of claim 1, further comprising a controller, which processes the information pulses at a predetermined sampling rate, wherein the first

information pulse comprises information relating to the pulse wheel, and the first information pulse provides~~which is sequentially~~ the most recent~~latest~~ information ~~disposed~~ to be processed by the~~a~~ controller.

3. (Currently Amended) The system~~method~~ of claim 1, further comprising a controller, which processes the information pulses at a predetermined sampling rate, wherein the second information pulse comprises information relating to the pulse wheel, and the second information pulse provides information which is sequentially not the most recent~~latest~~ information ~~disposed~~ to be processed by ~~a~~ the controller, but occurs prior in time to the most recent~~latest~~ information.

4. (Cancelled)

5. (Currently Amended) The system ~~method~~ of claim 1, wherein the first information pulse provides~~is~~ phase angle information sensed by the sensor out of the pulse wheel.

6. (Currently Amended) The system ~~method~~ of claim 1, wherein the second information pulse provides~~is~~ phase angle information sensed by the sensor out of the pulse wheel.

7. (Currently Amended) The system~~method~~ of claim 1, wherein the rotating shaft is a cam-shaft of an internal combustion engine.

8. (Currently Amended) The system~~method~~ of claim 1, wherein the rotating shaft is a crank shaft of an internal combustion engine.

9. (Currently Amended) The system~~method~~ of claim 1, wherein the pulse wheel comprises a wheel having teeth distributed thereon.

10. (Currently Amended) A method for utilizing information provided by a pulse wheel and sensed by a sensor, comprising the steps of:

providing a rotating shaft;

providing a pulse wheel rigidly affixed onto the rotating shaft;

~~providing a sensor~~ sensing a plurality of~~n~~ information pulses out of the pulse wheel, wherein the ~~sensed~~ information pulses comprise~~ing~~ a first information pulse and a second information pulse and a sensor senses the information pulses;

~~providing a controller controlling or~~ processing the ~~sensed~~ information pulses out of the pulse wheel at a predetermined sampling rate, wherein a controller processes the information; and

~~when the rotating rate of the rotating shaft is greater than a predetermined value,~~ averaging at least the first information pulse and the second information pulse~~at least two pulses~~ when a rotating rate of the rotating shaft is greater than a predetermined value~~, wherein one of the at least two pulses being related to the first information and at least one pulse being related to the second information;~~ such that the first information pulse and the second information ~~is used along with the first information~~ pulse accurately represent the plurality of information pulses in a variable cam timing measurement system~~for for a more accurate representation of the information~~.

11. (Currently Amended) The method of claim 10, wherein the first information pulse comprises information relating to the pulse wheel, which is sequentially the most recent~~latest~~ information ~~disposed~~ to be processed by the controller.

12. (Currently Amended) The method of claim 10, wherein the second information pulse comprises information relating to the pulse wheel, which is sequentially not the most recent~~latest~~ information ~~disposed~~ to be processed by the controller, but occurs prior in time to the most recent~~latest~~ information.

13. (Cancelled)

14. (Currently Amended) The method of claim 10, wherein the controller is an engine control unit.

15. (Currently Amended) The method of claim 10, wherein the first information pulse provides~~is~~ phase angle information sensed by the sensor out of the pulse wheel.

16. (Currently Amended) The method of claim 10, wherein the second information pulse provides~~is~~ phase angle information sensed by the sensor out of the pulse wheel.

17. (Currently Amended) The method of claim 10, wherein the rotating shaft is a cam-shaft of an internal combustion engine.

18. (Currently Amended) The method of claim 10, wherein the rotating shaft is a crank-shaft of an internal combustion engine.

19. (Currently Amended) The method of claim 10, wherein the pulse wheel comprises a wheel having teeth distributed thereon.

REMARKS

The office action of December 13, 2004 has been reviewed and its contents carefully noted. Reconsideration of this case, as amended, is requested. Claims 1-3, 5-12, and 14-19 remain in this case, claims 4 and 13 being cancelled, and claims 1-3, 5-12, and 14-19 being amended by this response. No new matter has been added. More specifically, the amendments to claims 1 and 10 are fully supported by the specification on page 12, lines 1-4.

Objections to the Specification

The title was objected to as not being descriptive. The title has been amended to overcome this objection. Reconsideration and withdrawal of the objection is respectfully requested.

Objections to the Drawings

The drawings were objected to because they included reference numerals 36 and 37, which were not described in the specification. The specification has been amended to overcome this objection.

More specifically, the specification has been amended to include these reference numerals. No new matter has been added. The reference numerals were originally omitted due to a typographical error, where reference numerals 36 and 37 were inadvertently replaced by reference numerals 38 and 39. Reconsideration and withdrawal of the objection is respectfully requested.

Objections to the Claims

The Examiner pointed out that, if claims 2-9 were found allowable, claims 11-13 and 15-19 would be objected to as being a substantial duplicate thereof. Claims 11-13 and 15-19 should actually be dependent from method claim 10, and, as amended, do so. Therefore, they should no longer be considered duplicates of claims 2-9. Reconsideration and withdrawal of the objection is respectfully requested.

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Claims 4 and 13 were objected to because the claims were grammatically confusing and it was unclear what "threshold", "updates" and "loop" refer to in the claims. Although Applicant respectfully disagrees, claims 4 and 13 have been cancelled to further prosecution of the application. Reconsideration and withdrawal of the objection is respectfully requested.

Claims 11, 12, and 14 were objected to because they included "the controller", and there is no antecedent basis for a controller. As discussed above, these claims should be dependent upon claim 10, and have been amended as such. A controller is included in claim 10. Reconsideration and withdrawal of the objection is respectfully requested.

Rejection under 35 U.S.C. §102

Claims 1-6, 8-16, 18 and 19 were rejected under 35 U.S.C. 102(b) as being anticipated by Remboski et al. (5,906,652). Applicant respectfully disagrees with the rejection.

The present invention provides a method and system "such that when a controller relating to a VCT system having pulse wheel for measurement purposes misses some of the sensored or measured information, the method or system can still use the missed information." (present application page 7, lines 28-30).

In contrast, Remboski et al. discloses a "method and system of misfire determination [that] includes establishing an acceleration misfire threshold and an acceleration sub-misfire threshold. Then incremental engine position is sensed and a series of acceleration data-points are derived (401). If a data-point of the series of acceleration data-points falls between the sub-misfire threshold and the misfire threshold, then a training process is aborted for a blanking period based on a delay time whose length is preferably based on engine operating conditions (415). If a data-point of the series of acceleration data-points does not fall below the sub-misfire threshold, then the series of acceleration data-points, are averaged and a synchronously corrected acceleration data-point is derived (417). Then, a misfire condition is indicated when the synchronously corrected acceleration data-point exceeds the established acceleration misfire threshold (421)." (Abstract)

Remboski's system and method are completely different from that of the present invention. Remboski uses an averaging method to detect engine acceleration, while the present

invention allows for better variable cam timing control. The fact that both use averaging at some point does not create sufficient similarity to satisfy the requirements for anticipation.

The system of amended claim 1 includes, in part, "wherein when a rotating rate of the rotating shaft is greater than a predetermined value, at least the first information pulse and the second information pulse are averaged". The Examiner points to col. 2, lines 33-36 of Remboski to support his assertion that Remboski discloses this limitation of claim 1. This passage reads: "[i]f a data-point of the series of acceleration data-points does not fall below the sub-misfire threshold, then the series of acceleration data-points are averaged and a synchronously corrected acceleration data-point is derived dependent thereon." There is no averaging of at least a first information pulse and a second information pulse in Remboski. Instead, a series of acceleration data-points are averaged. Remboski does disclose "time-spaced pulses" (see col. 4, lines 36-40). However, these pulses <u>are not averaged.</u>

The Examiner states that the acceleration data-points in Remboski are equivalent to the "first information" and the "second information" in claim 1. The acceleration data-points in Remboski are not first or second information pulses.

Remboski discusses the derivation of the acceleration data-points at length:

> "FIG. 1 is a block diagram of a misfire detection system using synchronous correction in accordance with the preferred embodiment of the invention. The misfire detection system shown here is coupled to a reciprocating engine. A multi-toothed wheel 101 is coupled to a crankshaft of the engine, and a single-toothed wheel 107 is coupled to a camshaft of the engine. A sensor 103, preferably a variable reluctance type sensor, senses motion of the multi-toothed wheel 101 and produces an incremental engine position signal 105, essentially a series of time-spaced pulses. Another sensor 109, again preferably a variable reluctance type sensor, senses motion of the single-toothed wheel 107 and produces an absolute engine position signal 111. Tooth selector logic 113 is used to choose which tooth crossing signals 105 provided by sensor 103 are used to calculate engine crankshaft acceleration. In effect, tooth selector logic 113 decimates the output of sensor 105 to the highest even sample period which removes any encoder missing teeth on multi-toothed wheel 101. Block 115 calculates a series of time differences 116 between each of the series of time-spaced pulses as the multi-toothed wheel 101 rotates. Effectively elements 101, 103, 107, 109, 113, and 115 measure engine rotary position. The series of time differences 116 is

passed to a lowpass filter 117, which creates a series of lowpass-filtered time differences 118. While the engine is operating, various sensors 121 measure engine speed, temperature, load, and other vehicle operating conditions. Operation of the lowpass filter 117 is governed by filter coefficients 119, that are derived dependent on the measured engine and vehicle operating conditions 121 as well as engine performance profiles developed in a calibration, or powertrain mapping process.

Next, a decimator 123 decimates the lowpass-filtered time differences 118 and provides a series of selected time differences 120. Which time differences, of the lowpass-filtered time differences 118, are selected depends on the number of time differences required for misfire detection. In the preferred embodiment, the decimator 123 decimates the lowpass-filtered time differences 118 to the firing rate of the engine (i.e. to one event per cylinder). Decimation rate selection 125 depends on the firing rate of the engine, and is indexed to absolute engine position via the tooth selector logic 113. Decimating the lowpass-filtered time differences 118 here, before post-processing that follows is very advantageous because the amount of data which needs to be post-processed is greatly reduced compared to the prior art wherein decimation was not performed until after post-processing (reference Remboski et al).

Then, in block 127 a velocity of each of the series of selected time differences 120 is calculated based on the series of selected time differences 120, and a series of velocity data-points 122 is provided dependent thereon.

Next, in block 129 an acceleration of each of series of velocity data-points 122 is calculated by differentiating the series of velocity data-points 122, and a series of acceleration data-points 124 is provided dependent thereon." (col. 4, line 30 to col. 5, line 18)

The acceleration data-points are derived through a series of calculations. They are not a first information pulse or a second information pulse.

Amended claim 1 also includes, in part "such that the first information pulse and the second information pulse accurately represent the plurality of information pulses in a variable cam timing measurement system." Remboski do not disclose a variable cam timing measurement system. Instead, Remboski discloses a misfire detection system. The data acceleration points in Remboski do not represent a plurality of information pulses in a variable cam timing system.

Since claim 1 includes multiple elements not disclosed in Remboski, claim 1 is not anticipated by Remboski. Reconsideration and withdrawal of the rejection of claim 1 is respectfully requested.

Claim 5 includes "wherein the first information pulse provides phase angle information sensed by the sensor out of the pulse wheel". The Examiner states that "[T]he acceleration data-points are dependent upon phase angle information sensed by the sensor (103) of the pulse wheel (101), and thus the first information is phase angle information sensed by the sensor of the pulse wheel as claimed." (present office action dated December 13, 2004, page 6, lines 12-15). Acceleration data-points are not the same as phase angle information. Phase angle information, which is the relative angular displacement between the camshaft and the crankshaft, is not equivalent to an engine position signal. Remboski does not provide phase angle information. Therefore, Remboski does not disclose a first information pulse providing phase angle information sensed by the sensor of the pulse wheel.

Claim 6 includes "wherein the second information pulse provides phase angle information sensed by the sensor out of the pulse wheel". The Examiner states that "[T]he acceleration data-points are dependent upon phase angle information sensed by the sensor (103) of the pulse wheel (101), and thus the second information is phase angle information sensed by the sensor of the pulse wheel as claimed." (present office action dated December 13, 2004, page 7, lines 1-4). Acceleration data-points are not the same as phase angle information. Phase angle information, which is the relative angular displacement between the camshaft and the crankshaft, is not equivalent to an engine position signal. Remboski does not provide phase angle information. Therefore, Remboski does not disclose a second information pulse providing phase angle information sensed by the sensor of the pulse wheel.

Claims 2-3, 5-6 and 8-9, being dependent upon and further limiting claim 1, should also be allowable for that reason, as well as for the additional recitations they contain. Reconsideration and withdrawal of the rejection of claims 2-3, 5-6 and 8-9 are respectfully requested.

The method of amended claim 10 includes, in part, "averaging at least the first information pulse and the second information pulse when a rotating rate of the rotating shaft is

greater than a predetermined value". The Examiner points to col. 2, lines 33-36 of Remboski to support his assertion that Remboski discloses this limitation of claim 10. This passage reads: "[i]f a data-point of the series of acceleration data-points does not fall below the sub-misfire threshold, then the series of acceleration data-points are averaged and a synchronously corrected acceleration data-point is derived dependent thereon." There is no averaging of at least a first information pulse and a second information pulse in Remboski. Instead, a series of acceleration data-points are averaged. Remboski does disclose "time-spaced pulses" (see col. 4, lines 36-40). However, these pulses are not averaged.

The Examiner states that the acceleration data-points in Remboski are equivalent to the "first information" and the "second information" in claim 10. The acceleration data-points in Remboski are not first or second information pulses.

Amended claim 10 also includes, in part "such that the first information pulse and the second information pulse accurately represent the plurality of information pulses in a variable cam timing measurement system." Remboski do not disclose a variable cam timing measurement system. Instead, Remboski discloses a misfire detection system. The data acceleration points in Remboski do not represent a plurality of information pulses in a variable cam timing system.

Since claim 10 includes multiple elements not disclosed in Remboski, claim 10 is not anticipated by Remboski. Reconsideration and withdrawal of the rejection of claim 10 is respectfully requested.

Claim 15 includes "wherein the first information pulse provides phase angle information sensed by the sensor out of the pulse wheel". The Examiner states that "[T]he acceleration data-points are dependent upon phase angle information sensed by the sensor (103) of the pulse wheel (101), and thus the first information is phase angle information sensed by the sensor of the pulse wheel as claimed." (present office action dated December 13, 2004, page 6, lines 12-15). Acceleration data-points are not the same as phase angle information. Phase angle information, which is the relative angular displacement between the camshaft and the crankshaft, is not equivalent to an engine position signal. Remboski does not provide phase angle information.

Therefore, Remboski does not disclose a first information pulse providing phase angle information sensed by the sensor of the pulse wheel.

Claim 16 includes "wherein the second information pulse provides phase angle information sensed by the sensor out of the pulse wheel". The Examiner states that "[T]he acceleration data-points are dependent upon phase angle information sensed by the sensor (103) of the pulse wheel (101), and thus the second information is phase angle information sensed by the sensor of the pulse wheel as claimed." (present office action dated December 13, 2004, page 7, lines 1-4). Acceleration data-points are not the same as phase angle information. Phase angle information, which is the relative angular displacement between the camshaft and the crankshaft, is not equivalent to an engine position signal. Remboski does not provide phase angle information. Therefore, Remboski does not disclose a first information pulse providing phase angle information sensed by the sensor of the pulse wheel.

Claims 11-12, 14-16 and 18-19, being dependent upon and further limiting claim 10, should also be allowable for that reason, as well as for the additional recitations they contain. Reconsideration and withdrawal of the rejection of claims 11-12, 14-16 and 18-19 is respectfully requested.

Rejection under 35 U.S.C. §103

Claims 7 and 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Remboski.

Applicant respectfully disagrees with this rejection. The arguments regarding the anticipation of claims 1 and 10 over Remboski are incorporated herein by reference.

Regarding claim 1, upon which claim 7 depends, Remboski does not teach or suggest all of the elements of the claim.

The system of amended claim 1 includes, in part, "wherein when a rotating rate of the rotating shaft is greater than a predetermined value, at least the first information pulse and the second information pulse are averaged". Remboski et al does not teach or suggest averaging of at least a first information pulse and a second information pulse. Instead, a series of acceleration data-points are averaged. Remboski does teach "time-spaced pulses" (see col. 4, lines 36-40). However, these pulses are not averaged.

The Examiner states that the acceleration data-points in Remboski are equivalent to the "first information" and the "second information" in claim 1. The acceleration data-points in Remboski are not first or second information pulses.

Amended claim 1 also includes, in part "such that the first information pulse and the second information pulse accurately represent the plurality of information pulses in a variable cam timing measurement system." Remboski do not teach or suggest a variable cam timing measurement system. Instead, Remboski teaches a misfire detection system. The data acceleration points in Remboski do not represent a plurality of information pulses in a variable cam timing system.

Since claim 1 includes multiple elements not taught or suggested in Remboski, claim 1 is not obvious over Remboski. Claim 7, being dependent upon and further limiting claim 1, should also be allowable for that reason, as well as for the additional recitations it contains. Reconsideration and withdrawal of the rejection of claim 7 is respectfully requested.

Regarding claim 10, upon which claim 17 depends, Remboski does not teach or suggest all of the elements of the claim.

The method of amended claim 10 includes, in part, "averaging at least the first information pulse and the second information pulse when a rotating rate of the rotating shaft is greater than a predetermined value". Remboski does not teach or suggest averaging of at least a first information pulse and a second information pulse. Instead, a series of acceleration data-points are averaged. Remboski does teach "time-spaced pulses" (see col. 4, lines 36-40). However, these pulses <u>are not averaged.</u>

The Examiner states that the acceleration data-points in Remboski are equivalent to the "first information" and the "second information" in claim 10. The acceleration data-points in Remboski are not first or second information pulses.

Amended claim 10 also includes, in part "such that the first information pulse and the second information pulse accurately represent the plurality of information pulses in a variable cam timing measurement system." Remboski do not teach or suggest a variable cam timing measurement system. Instead, Remboski teaches a misfire detection system. The data

acceleration points in Remboski do not represent a plurality of information pulses in a variable cam timing system.

Since claim 10 includes multiple elements not taught or suggested by Remboski, claim 10 is not anticipated by Remboski. Claim 17, being dependent upon and further limiting claim 10, should also be allowable for that reason, as well as for the additional recitations it contains. Reconsideration and withdrawal of the rejection of claim 17 is respectfully requested.

Conclusion

Applicant believes the claims, as amended, are patentable over the prior art, and that this case is now in condition for allowance of all claims therein. Such action is thus respectfully requested. If the Examiner disagrees, or believes for any other reason that direct contact with Applicants' attorney would advance the prosecution of the case to finality, he is invited to telephone the undersigned at the number given below.

"Recognizing that Internet communications are not secured, I hereby authorize the PTO to communicate with me concerning any subject matter of this application by electronic mail. I understand that a copy of these communications will be made of record in the application file."

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sampling rate, wherein the first information pulse comprises information relating to the pulse wheel, and the first information pulse provides the most recent information to be processed by the controller.

3. The system of claim 1, further comprising a controller, which processes the information pulses at a predetermined sampling rate, wherein the second information pulse comprises information relating to the pulse wheel, and the second information pulse provides information which is sequentially not the most recent information to be processed by the controller, but occurs prior in time to the most recent information.

4. The system of claim 1, wherein the first information pulse provides phase angle information sensed by the sensor out of the pulse wheel.

5. The system of claim 1, wherein the second information pulse provides phase angle information sensed by the sensor out of the pulse wheel.

6. The system of claim 1, wherein the rotating shaft is a cam-shaft of an internal combustion engine.

7. The system of claim 1, wherein the rotating shaft is a crank shaft of an internal combustion engine.

8. The system of claim 1, wherein the pulse wheel comprises a wheel having teeth distributed thereon.

9. A method for utilizing information provided by a pulse wheel and sensed by a sensor, comprising the steps of:

providing a rotating shaft;

providing a pulse wheel rigidly affixed onto the rotating shaft;

sensing a plurality of information pulses out of the pulse wheel, wherein the information pulses comprise a first information pulse and a second information pulse and a sensor senses the information pulses;

processing the information pulses out of the pulse wheel at a predetermined sampling rate, wherein a controller processes the information; and

averaging at least the first information pulse and the second information pulse when a rotating rate of the rotating shaft is greater than a predetermined value such that the first information pulse and the second information pulse accurately represent the plurality of information pulses in a variable cam timing measurement system.

10. The method of claim 9, wherein the first information pulse comprises information relating to the pulse wheel, which is sequentially the most recent information to be processed by the controller.

11. The method of claim 9, wherein the second information pulse comprises information relating to the pulse wheel, which is sequentially not the most recent information to be processed by the controller, but occurs prior in time to the most recent information.

12. The method of claim 9, wherein the controller is an engine control unit.

13. The method of claim 9, wherein the first information pulse provides phase angle information sensed by the sensor out of the pulse wheel.

14. The method of claim 9, wherein the second information pulse provides phase angle information sensed by the sensor out of the pulse wheel.

15. The method of claim 9, wherein the rotating shaft is a cain-shaft of an internal combustion engine.

16. The method of claim 9, wherein the rotating shaft is a crank-shaft of an internal combustion engine.

17. The method of claim 9, wherein the pulse wheel comprises a wheel having teeth distributed thereon.

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